

# Cryogenic Selective Surfaces based on diffusing materials

Completed Technology Project (2016 - 2017)



## Project Introduction

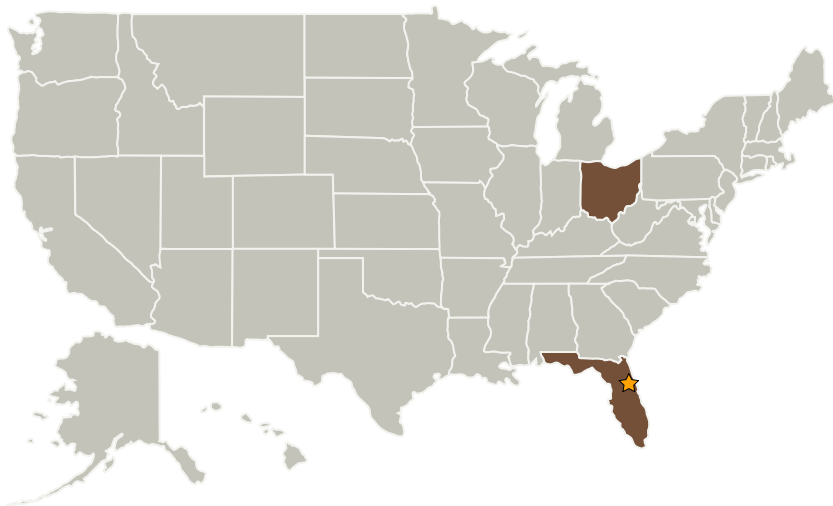
The goal of the proposed project is to model, fabricate, and test cryogenic selective surfaces based on a rigid diffusive surface placed on a silver layer.

## Anticipated Benefits

This concept is of great potential value to NASA. Firstly, if successful, it would provide a means for maintaining cryogenic commodity, e.g. LOX, on a trip to Mars. This is not possible under current technology and was highlighted by the NIAC review board as an important goal of the work. Maintenance of cryogenic commodities in deep space is a current need within the NASA community as highlighted by TA14.1-“Maintain cryogenic temperatures to enable longer duration missions that use cryogenic propellants...”. In addition NASA’s strategic plan (2014) Objective 1.1 states “Expand human presence... to the surface of Mars to advance...innovation.” This project fits within that objective.

One of NASA’s most significant challenges is dealing with the damage to astronauts caused by galactic cosmic radiation (GCR). To date there is no solution to this problem, however, shielding with magnetic fields based on superconducting cable may work. The proposed technology may allow superconducting cable to operate passively in space, enabling the development of a GCR shield.

## Primary U.S. Work Locations and Key Partners



These images show the optical scattering and back reflection of a Shuttle tile, a diffuse single component material like the ones we hope to develop in this project.

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Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida

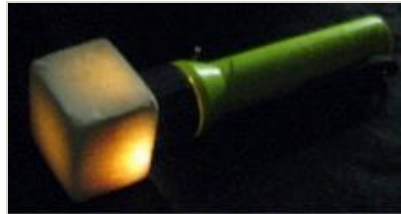
Primary U.S. Work Locations	
Florida	Ohio

## Images



## Untitled

These images show the optical scattering and back reflection of a Shuttle tile, a diffuse single component material like the ones we hope to develop in this project. (<https://techport.nasa.gov/image/20780>)



## Untitled

These images show the optical scattering and back reflection of a Shuttle tile, a diffuse single component material like the ones we hope to develop in this project. (<https://techport.nasa.gov/image/20779>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Mission Support Directorate (MSD)

**Lead Center / Facility:**

Kennedy Space Center (KSC)

**Responsible Program:**

Center Independent Research &amp; Development: KSC IRAD

## Project Management

**Program Manager:**

Barbara L Brown

**Project Manager:**

Robert C Youngquist

**Principal Investigator:**

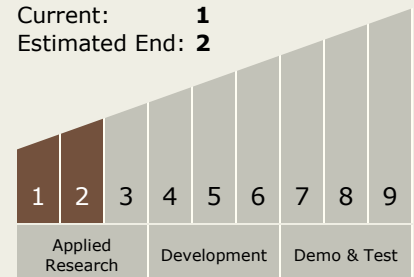
Robert C Youngquist

## Technology Maturity (TRL)

Start: 1

Current: 1

Estimated End: 2



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## Technology Areas

### Primary:

- TX14 Thermal Management Systems
  - └ TX14.1 Cryogenic Systems
    - └ TX14.1.1 In-space Propellant Storage & Utilization

## Target Destinations

Earth, Others Inside the Solar System, Foundational Knowledge

## Supported Mission Type

Projected Mission (Pull)